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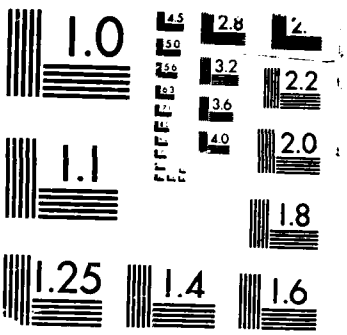


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'E-FORCE' is a bold, new concept for restructuring engineer forces. The E-FORCE concept will provide to the heavy divisions the organic combat engineer forces necessary to satisfy the mobility, countermobility, and survivability requirements in the forward combat area. During the past several years, the broad, basic thrust of the E-FORCE concept has been studied thoroughly and the general organizational architecture has been very critically examined. While the focus has been on the 'big picture', some secondary issues have avoided scrutiny. This study seeks to bring into sharper focus one such peripheral issue: the E-FORCE ribbon bridge company that is part of the Division Engineer element that is proposed for the heavy divisions. This study will look at a variety of issues that affect the requirement for river crossing support within the divisions. The issues to be analyzed include: the frequency and predictability of river crossing operations; the effective utilization of critical bridge assets; the responsiveness of the gap crossing support; the deployability and maneuverability of the heavy divisions; the vulnerability of critical river crossing assets; maintenance support; the delineation of responsibility for providing engineer support for river crossing operations; and the conduct of combined arms training in deliberate river crossing operations. The interrelationships of the individual issues will be examined and an attempt will be made to reach conclusions and make recommendations concerning the best way to provide bridging support to the heavy divisions.

USAWC MILITARY STUDIES PROGRAM PAPER



# GAP CROSSING OPERATIONS AND THE E-FORCE CONCEPT

AN INDIVIDUAL STUDY PROJECT

by

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U.S. Army War College
Carlisle Barracks, Pennsylvania 17013
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ABSTRACT

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The 'E-FORCE' is a bold, new concept for restructuring engineer forces. The E-FORCE concept will provide to the heavy divisions the organic combat engineer forces necessary to satisfy the mobility, countermobility, and survivability requirements in the forward combat area. During the past several years, the broad, basic thrust of the E-FORCE concept has been studied thoroughly and the general organizational architecture has been very critically examined. While the focus has been on the 'big picture', some secondary issues have avoided scrutiny. This study seeks to bring into sharper focus one such peripheral issue: the E-FORCE ribbon bridge company that is part of the Division Engineer element that is proposed for the heavy divisions. This study will look at a variety of issues that affect the requirement for river crossing support within the divisions. The issues to be analyzed include: the frequency and predictability of river crossing operations; the effective utilization of critical bridge assets; the responsiveness of the gap crossing support; the deployability and maneuverability of the heavy divisions; the vulnerability of critical river crossing assets; maintenance support; the delineation of responsibility for providing engineer support for river crossing operations; and the conduct of combined arms training in deliberate river crossing operations. The interrelationships of the individual issues will be examined and an attempt will be made to reach conclusions and make recommendations concerning the best way to provide bridging support to the heavy divisions.

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# GAP CROSSING OPERATIONS AND THE E-FORCE CONCEPT

## CHAPTER I

## INTRODUCTION

'E-FORCE' is a bold, new concept for restructuring engineer forces. During the past several years, the broad, basic thrust of the E-FORCE concept has been studied thoroughly and the general organizational architecture has been examined in great detail. The emphasis quite properly has been on the 'big picture'. Now that the 'big picture' has been brought into very sharp focus, it is time to look at some of those issues which have thus far avoided the close scrutiny that the real central issues have received.

### PURPOSE

The purpose of this paper is to examine one such peripheral issue: the E-FORCE bridge company located within the Division Engineer organization. With respect to bridging assets and capabilities, E-FORCE is neither bold nor new. The E-FORCE divisional bridge company is identical to the bridge company now found in the divisional engineer battalions of the heavy divisions. One must, of course, avoid jumping to a conclusion that the current design with respect to the bridge company is deficient simply because there has been no change. The current design may, in fact, be the best possible organizational response to the

anticipated requirements for bridging support to the heavy maneuver elements. On the other hand, it may not be. The deficiency lies simply in the fact that thus far, the issue has been on the periphery of the E-FORCE concept development process and has not been critically examined.[1] The study that follows is intended to serve as a basis for bringing this issue into sharper focus.

## BACKGROUND

The period of the 1980's has been one of tremendous change in the United States Army. A new doctrine has been adopted. Great strides have been taken to field the highly mobile and lethal systems that are required by that doctrine. Modernization, in many arenas, has been the most prominent of the four pillars (readiness, sustainability, modernization, and force structure) of national defense programs. Unfortunately, modernization in other arenas has lagged woefully behind.

The combat engineer of 1988 is faced with a challenge made greater by the progress made elsewhere in the army from 1980 to 1988. On today's high-tech and lethal battlefield, he must support today's highly mobile, modernized maneuver units with yesterday's equipment and force structure. The magnitude of this challenge and the severity of this problem are brought into focus by the realization that, when used to describe engineer equipment and organizational structure,

'yesterday' really means World War II.

The engineers, although initially left behind, are ready to catch up. Equipment modernization programs (eg the Armored Combat Earthmover [ACE], the Counter Obstacle Vehicle [COV], etc) are just recently beginning to fare much better in the resource allocation arena. The organizational architecture of the combat engineer forces will take a quantum leap forward with the approval and implementation of E-FORCE.

## THE E-FORCE CONCEPT

E-FORCE is an organizational concept developed by the Engineer School that, when approved, will bring order out of chaos. The chaos that currently exists stems from the simple fact that our close combat heavy maneuver forces do not have enough organic combat engineers. On the basis of many studies and much experience both in Europe and at the National Training Center, we have concluded that each maneuver Task Force in the forward combat zone requires an engineer company (as a minimum) to satisfy the mobility, countermobility, and survivability requirements of the task force.[2] Thus, a forward brigade must be supported by an engineer battalion. Since, however, current force structure provides only one engineer battalion organic to the entire division, the needed engineer support must come from an ad hoc mix of both divisional and non-divisional engineer units. This 'ad hocracy' and mixing of dissimilar units leads to

inherent inefficiencies and obvious confusion concerning command and control, logistical support, communication networks, combined arms training opportunities, and the quality and timeliness of engineer support. E-FORCE will change all that.

The basic organizational element of the E-FORCE concept is the Division Engineer (similar in both structure and title to the Division Artillery) composed of three engineer battalions, a headquarters and headquarters company, and a ribbon bridge company.[3] A detailed discussion of the deficiencies associated with our current engineer force structure and a lengthy explanation of how the E-FORCE concept will correct those deficiencies are beyond the scope of this paper. As indicated earlier, this paper will focus instead upon the E-FORCE bridge company. This focus will begin with an analysis of the mission requirements associated with the conduct of gap crossing operations within the division and an examination of alternative organizational responses to these requirements.

The basic thrust of this review and analysis, particularly as it applies to alternative organizational responses, will be aimed at the broad issue of the centralization versus the decentralization of ribbon bridge assets and capabilities. Normally, at least three alternatives would be examined: greater centralization, greater decentralization, and the status quo. The

alternative of greater decentralization (ie more capability at lower levels) would clearly and unavoidably require additional engineer force structure growth at the division level. As indicated earlier, the E-FORCE 'big picture' has already come into sharp focus. Broad parameters such as maximum total strength have been firmly fixed. An alternative requiring additional force structure growth within the Division Engineer element is simply not viable.[4] As a result, this study will be limited to considering two alternatives: the status quo and the centralization of ribbon bridge assets at echelons above division. A brief consideration of a modified status quo (eg fixed bridging in lieu of float bridging or a mix of fixed and float bridging within current strength parameters) will be found in Chapter II.

## STATUS QUO

With respect to bridging, the E-FORCE concept produces what might be called limited decentralization. A bridging capability is organic to the division, but it is clearly a limited capability. The E-FORCE divisional bridge company is equipped with approximately 144 meters of ribbon bridge. For gaps less than approximately eighteen meters wide, the armored vehicle launched bridge (AVLB) would normally be used to effect the crossing. Therefore, the organic bridging gives the heavy division an independent capability in the 18-144 meter range. A strong argument can be made that

multiple crossing sites are necessary to reduce the inherent congestion and vulnerability associated with a river crossing operation. Doctrine, in fact, calls for at least one bridge site per lead assault brigade.[5] Therefore, a division moving with two forward brigades would require at least two bridge sites. An approximate range of 18-72 meters is thus a better indication of true organic capability. Less than five per cent of the gaps greater than three meters that will be encountered in Western Europe fall within the 18-144 meter range. If a range of 18-72 meters is used, the per cent occurrence within the range drops to approximately three per cent.[6]

The organic, independent river crossing capability of the heavy divisions can be limited by other factors as well. A river crossing operation is a very specialized operation which will often require resources beyond the division's organic assets.[7] Corps resources for traffic control, smoke generation, FM communications, air defense, and other areas of support are frequently necessary. As a result, the overall planning and coordination for a deliberate river crossing are normally performed at corps or higher levels.[8] Thus, the division's current capability is limited in most cases to hasty crossings of rivers less than seventy-two meters wide (144 meters if only a single crossing site is planned). A hasty crossing is characterized by speed, surprise, and minimum loss of momentum and is feasible only

when the crossing areas are lightly held by the enemy or are undefended. It is noted that the division's bridge company has a rafting capability which is not directly limited by the width of the river. However, a crossing supported by only rafts would clearly not be able to sustain the crossing rates required to maintain the desired momentum.

## CENTRALIZATION

The 'greater centralization alternative' would result from simply moving the the ribbon bridge company to the E-FORCE Engineer Brigade located at corps. This alternative envisions no reduction in the overall ribbon bridge capability within the corps. There could be an opportunity to save a few spaces as the two-platoon companies from the divisions could be reformed into three-platoon companies when they become part of the combat engineer groups within the brigade. The command and control systems and logistical support systems at the engineer group level could absorb the additional bridge units without significant modification or impact.

## TECHNICAL APPROACH

There are, of course, a variety of issues which bear upon the central question. The approach to be used in this study is to discuss those issues individually and to analyze how the issue affects the centralization question and how a

centralization decision would impact upon the issue. The issues to be analyzed include the predictability and frequency of river crossing operations, the effective utilization of critical bridge assets, responsive support of gap crossing operations, the deployability and maneuverability of the heavy divisions, the vulnerability of critical river crossing assets, maintenance support, the delineation of responsibility for providing engineer support for river crossings, and the conduct of combined arms training in deliberate river crossing operations. The interrelationships of the individual issues will be discussed, and an attempt will be made to 'wrap everything together' and to reach overall conclusions and recommendations.

## ENDNOTES

1. Telephone conversation between the author and LTC(P) Russell L. Fuhrman, U.S. Army Engineer School, October 1987.

2. MAJ J. Richard Capka, MG Richard S. Kem, and MAJ Houng Y. Soo, "E-FORCE," Engineer, Spring, 1986, pp.10-15.

3. U.S. Army Engineer School, E-FORCE Staff Study.

4. Telephone conversation with LTC(P) Fuhrman.

5. U.S. Department of the Army, FM 90-13 River Crossing Operations, p. 3-25.

6. The BDM Corporation, Survey of Bridging Requirements for the Light Division Final Report , p. A-1.

7. FM 90-13, p. 1-1.

8. U.S. Department of the Army, FM 71-100 Armored and Mechanized Division Operations CO-ORDINATING DRAFT, p. 8-38.

## CHAPTER II

## GAP CROSSING REVIEW & ANALYSIS

In spite of the increased speed and mobility of modern weapon systems, rivers are still formidable obstacles, and river crossing operations remain an integral and critical part of land warfare. The same is true of other wet gaps such as canals, lakes, and wide streams and of some dry gaps. In order to put the following discussions into proper perspective and to avoid confusion and misunderstanding, it is useful to review briefly the key terms and to explain exactly how they will will be used.

For the purpose of this study, the term 'river' will be synonymous with the term 'wet gap'. A clear distinction must be drawn between wet and dry gaps when looking at the requirements for and the utility of ribbon bridge assets. A further general distinction will be made based upon the width of the gap. Gaps (both wet and dry) that can be bridged with an Armored Vehicle Launched Bridge (AVLB) will be referred to as 'short' gaps. (The gap crossing capacity of an AVLB is approximately eighteen meters.) Our discussion of requirements for river crossing support will assume that the crossing of all 'short' gaps will normally be supportable by the AVLB's in the E-FORCE battalions. A thorough discussion of the validity of that assumption is beyond the scope of this paper. It should be noted, however, that the Mission

Area Analysis of 1983 established twenty-four as the minimum number of AVLB's required in the heavy divisions. With a total of thirty-six AVLB's in the forward battalions of the E-FORCE Division Engineer element, the capability to satisfy the short gap requirements should be adequate, and the above assumption should be reasonably valid.

On the basis of the above, the term 'river crossing' when used in the following discussions will apply strictly to the crossing of wide, wet gaps (ie the crossings for which the ribbon bridge is well suited). The broader term 'gap crossing' will be used to include both wet and dry gaps.

## PREDICTABILITY

The predictability of a requirement in terms of time and location will have a significant impact upon the determination concerning the level at which the capability to satisfy that requirement should be found.

### General Discussion

By its very nature, a river crossing operation should be very predictable. The general characteristics of most rivers in the world have been studied and recorded. Militarily significant rivers, streams, and canals in areas of potential combat operations can be studied in great detail during peacetime. Knowing the location and key characteristics of wet gaps which will be encountered within a theater of operations permits thorough pre-planning of potential river

crossing requirements. The enemy situation, on the other hand, is much less predictable and will have an obvious impact on those plans. Nevertheless, the ability to predict and to plan -- within the context of a fluid tactical situation -- clearly does exist. In some theaters (eg Europe and Korea) it exists to a very high degree. The ability to anticipate requirements and to execute pre-planned contingencies should clearly enhance the responsiveness of the river crossing support available from non-divisional engineer units at echelons above division.

Conclusion

Requirements which are highly predictable lend themselves very well to centralized planning and decentralized execution. River crossing operations (particularly in some theaters) are inherently predictable. The centralization of ribbon bridge assets at echelons above division would appear to be very feasible based upon the ability to predict, pre-plan, and provide the support if and when it is needed.

## FREQUENCY

Generally speaking, as the frequency of a mission requirement increases, so does the need to decentralize the capability to satisfy that requirement down to the level at which the requirement exists. On the other hand, the less frequent the requirement, the greater is the capacity to provide the mission capability to a lower echelon when and

only when it is needed. This is especially true for events which can be readily anticipated.

General Discussion

Determining the anticipated frequency of the requirement to conduct hasty river crossing operations within the division is extremely important to the overall question of centralization versus decentralization of bridge assets. The importance associated with the question is matched by the difficulty associated with answering it. To do so with great accuracy and precision, one must know exactly how the flow of the battle is going to go in the next war. It was noted earlier that river crossings are inherently predictable. The locations and key characteristics are known, and crossing requirements can be anticipated on the basis of the tactical situation and the plans for future operations. What is difficult, however, is to predict in a macro sense 'how many?' and 'how often?'. In an attempt to answer those questions, let us look at the available data concerning gaps in Central Europe.

Gap Data

Three sets of gap data were reviewed for this study: data from a 1971 study by the Defense Intelligence Agency (DIA); data generated by the Waterways Experiment Station (WES) in 1969, and data derived from a survey by the Royal Engineers (RE) in 1959 of actual gap crossing requirements between Arnhem and Berlin during World War II. The WES and

RE data were found to be most useful.

WES Data

According to the WES data (which resulted from a survey of three east-west corridors in the Federal Republic of Germany), the vast majority of the gaps encountered were 'short' gaps. Gaps greater than eighteen meters wide were encountered at intervals of roughly seventy-five kilometers.[9] Approximately one half of those would be beyond the capability of the ribbon bridge assets now found in the division. One could conclude, therefore, that the division bridge company would be independently capable roughly every 150 kilometers.

We know how fast our modern weapon systems can dash across the battlefield when measured in kilometers per hour. What is more difficult to forecast is the average distances that major maneuver elements will normally cover during a typical day, week, or month of battle. A judgment, perhaps, can be derived from historical data.

RE Data

The Royal Engineer (RE) data is historically based. As such it includes only gaps for which engineer support was actually required (as opposed to the WES study which counted all gaps), and it permits a review of the issue from a time perspective.

According to the RE data, roughly one half of the 224

gaps could be crossed using AVLB's. Of the 113 'wide' gaps, only seventeen were wet. Of these seventeen, most were beyond the capability of currently organic bridge assets.[10] Wet gaps within the independent capability of the current divisional bridge company occurred roughly every 150 kilometers (surprisingly consistent with the WES survey). Wet gaps wider than eighteen meters occurred approximately every forty to fifty kilometers (more frequently than in the WES survey).

In terms of time, the drive from Arnhem to Berlin covered just about seven months (October 1944 - April 1945). Major river crossings occurred approximately twice a month.

## Conclusions

More terrain analysis, more historical analysis, and/or more war-gaming is necessary to resolve more accurately the frequency issue.

On the basis of the data reviewed for this study, a couple of very general conclusions can be made. First, a very high gap encounter rate can be expected for 'short' gaps. Second, the requirement to cross wide, wet gaps will not be an extremely frequent occurrence. Such activities are more likely to occur weekly or bi-weekly than daily. Both the accuracy and the precision of this assessment need to be increased by further studies.

## EFFECTIVE UTILIZATION

### General

The premium placed upon mobility b. our AirLand Battle doctrine places a similar premium upon our gap crossing capabilities and especially upon those limited assets on which our capabilities depend. It is clearly necessary to establish a command and control system for bridge assets and units which will facilitate their effective utilization.

Effective utilization can be expected to occur when assets are reasonably well-matched to the requirements or when the capability exists to match assets to the requirements as those requirements develop. The requirements will, of course, be both location and situation dependent. To determine in very rough terms the anticipated gap crossing requirements in a European theater, we turn again to the gap data cited in the previous section.

From that data, we can draw some very general, but, at the same time, very useful conclusions. It will be useful to review the data and consider the requirements in three distinct categories: 1) short gaps (both wet and dry), 2) wide gaps (dry), and 3) wide gaps (wet).

### Short Gaps

Both the WES data and the RE data show that a significant number of the gaps to be encountered in Central Europe will be less than eighteen meters wide. The RE data,

which includes only gaps for which bridging was actually installed, shows that fully fifty per cent of those gaps were short. For the WES data, the vast majority (greater than ninety per cent) of the gaps are short.[11]

For the 'short' gaps, either wet or dry, the asset to match with the requirement is the AVLB. Due to the great frequency of the short-gap requirement, it is clearly appropriate to have this asset completely decentralized in the E-FORCE Division Engineer Battalions which will be in support of the maneuver brigades. (The AVLB's themselves are found in the Assault Sections of the Assault and Obstacle Platoons of the E-FORCE Division Engineer Companies.[12]) The fielding of the Heavy Assault Bridge (HAB) with its Class 70 capability at spans of roughly thirty meters will further enhance the capability of the E-FORCE engineers to support the in-stride crossing of short gaps.

Wide Gaps

Gaps greater than eighteen meters in width present a much more difficult and, generally speaking, more complicated crossing challenge. Once the gap crossing can not be effected by simply launching an AVLB, the various characteristics of the gap become increasingly important. One such characteristic that takes on tremendous importance when trying to identify appropriate gap crossing equipment is simply whether the gap is wet or dry.

According to both the WES and the RE data, most of the

gaps wider than eighteen meters are, in fact, dry. The data indicates that in Central Europe, roughly 70-85% of the wide gaps to be encountered will be dry.[13] In more mountainous terrain (southern Europe, southwest Asia, etc), the percentage of dry gaps will be even higher.[14]

The recognition that the mobility challenges of the battlefield will include both wet and dry wide gaps carries with it a recognition that matching assets with requirements can be done only at a level which has command and control of both fixed and float bridge assets. According to current E-FORCE design, that level is at Corps. Our review of the distribution of bridge assets and the command and control of bridge units will consider wet and dry gaps separately.

Dry Gaps (Wide)

Dry gaps, of course, come in all shapes and sizes. In some cases breaching the obstacle may require nothing more than a hasty earth moving effort. In some cases, the dry gap may not even be an obstacle to off-the-road combat vehicles. In other cases, bridging will have to be installed. All dry gaps, however, share one common characteristic: They render useless the float-bridging and rafting capabilities of a Ribbon Bridge Company.

In view of the anticipated requirements as discussed earlier (70-85% of the wide gaps are expected to be dry), one might question the centralization of fixed bridge assets at corps (an E-FORCE Engineer Brigade will have a total of six

Medium Girder Bridge (MGB) companies[15]) while float bridge assets are decentralized down to the division. Two factors in support of the current distribution must be considered.

First, not all wide, dry gaps will need to be bridged. As also discussed earlier, many dry gaps are not obstacles to combat vehicles, and many others can be reduced better by moving earth than by building a bridge. The capability of the E-FORCE engineers to support the latter category has been enhanced significantly by the fielding of the Armored Combat Earthmover (ACE).

Second, the fixed bridges in our current inventory (Medium Girder and Bailey) are not really assault crossing assets. They are seldom used during the initial assault because of the time and effort required to put the bridge in place.[16] The bridge assets organic to the division are there primarily to support assault crossings. If an asset is not well suited to support the conduct of hasty, assault crossings, a doctrinal basis does not exist to make that asset organic to the division. Assets to support deliberate crossings can be at echelons above division, because deliberate crossings, by definition, allow for a pause to acquire additional bridging equipment from higher echelons.[17]

The apparent advantage, therefore, that fixed bridges have over float bridges (their utility in crossing both dry and wet gaps) is more than offset by the lack of an assault crossing capability. This distinction is important and strongly supports the placement of all fixed bridge assets at

echelons above division. The replacement of all or part of the float bridge assets currently organic to the division with fixed bridge assets (the 'modified status quo' alternative) is therefore not recommended.

Wet Gaps (Wide)

The review of anticipated crossing requirements for wide, wet gaps will start with an analysis of the gap data for wet gaps greater than eighteen meters wide (ie rivers). For this analysis, we will look specifically at rivers between eighteen and seventy-two meters wide (those considered to be within the independent capability of the bridge assets/units currently organic to the division) and at rivers wider than seventy-two meters (those which will require bridge assets from echelons above division). The distribution of the rivers into those two width categories in terms of simple per cent of occurrence is shown below: (The DIA data, which excludes dry gaps and short gaps, is useful for this analysis and is cited here.)

| | % Occurrence[18] | |
|---|---|---|
| | 18-72m | ≥72m |
| WES Data | 53% | 47% |
| DIA Data | 51% | 49% |
| RE Data | 24% | 76% |

For two of the data sets (WES and DIA), current organic assets make the division independently capable roughly fifty

per cent of the time. Such a capability is not insignificant. At the same time, the current E-FORCE design places 64% of the float bridge assets in the corps sector in the E-FORCE Engineer Brigade at corps.[19] These corps assets give the Corps Commander/Engineer some flexibility with regard to matching assets with requirements throughout the corps sector, although not a total and absolute capability of doing so. Total centralization of float bridge assets would, of course, result in greater flexibility at corps and thus could promote a more effective and more efficient utilization of those assets.

## Conclusions

With respect to the effective utilization of bridge assets, the following conclusions are drawn:

- The AVLB and fixed bridge assets are assigned to the appropriate organizational levels based upon the anticipated requirements and the utility (or lack thereof) of those assets and the manner in which they would be used to satisfy the requirements.
- According to the WES and DIA gap data, the float bridge assets currently assigned to the division could be effectively utilized independent of additional assets from corps on roughly 50% of the wet gaps wider than eighteen meters.
- With 64% of the float bridge assets at corps, that headquarters has centralized command and control of

adequate assets to influence the action and to promote effective utilization of float bridge assets throughout the corps sector.

## RESPONSIVE SUPPORT

Success on the battlefield is not dependent solely upon the effective or efficient utilization of assets. When discussing engineer support of river crossing operations, the responsiveness of that support is equally as important as its effectiveness and more important by far than matters of efficiency. Therefore, we need to examine the impact that greater centralization of bridge assets could have on the responsiveness of the support provided.

### General Discussion

I believe that we can accept as valid the general proposition that support capabilities organic to the division are normally more readily and rapidly available to satisfy developing requirements in the division sector than are non-divisional support capabilities. This proposal is a general assessment of relative attributes only and makes no evaluation of the absolute responsiveness of either divisional nor non-divisional support. It must also be noted that many factors can enhance the responsiveness of non-divisional support. Under some circumstances, non-divisional support can be just as responsive as organic support.

One factor that could enhance the responsiveness of the

non-divisional support is the predictability of the requirement. When support requirements are highly predictable, the provision of support from non-divisional sources can be well planned and thus the support can be very readily available when and where it is needed. As indicated earlier, river crossing operations are highly predictable events. But perfect predictability cannot always be guaranteed. Sudden changes in the tactical situation could very easily generate requirements and/or opportunities for the conduct of river crossing operations which are completely unexpected. In these situations, engineer support is very likely to be more responsive if the Division Engineer has organic capabilities with which to react.

The fact that the organic assets in the division may in some cases fall short of the total requirement need not negate the high degree of responsiveness that can be achieved with those assets. The organic assets will normally be sufficient to conduct the initial rafting phase of an assault crossing and to cross the critical assault vehicles required to secure initial far-shore objectives. Thus the operation can begin in a timely manner. It need not wait on engineer support. And it can continue without delay if assets from corps can be obtained in the time required to complete the rafting phase. So even when limited organic assets are not independently capable, they can be used within their capabilities to provide responsive action and support.

Conclusions

The support of unanticipated river crossing requirements and opportunities will normally be more responsive if the Division Engineer has organic assets with which to react. The status quo alternative is supported fairly strongly by this issue.

## STRATEGIC DEPLOYABILITY

General Discussion

The centralization of ribbon bridge assets at echelons above division would obviously make the divisions a little 'leaner' and more deployable than they are with the E-FORCE bridge company as an organic element. At a strength of 128 soldiers and equipped with thirty-six bridge transporters, the bridge company adds rather significantly to the total strength, weight, and cube of the division and thus adversely affects the division's deployability and maneuverability.

An analysis of this adverse impact must consider other factors. First, it must be remembered that centralization does not eliminate the deployability requirements associated with the ribbon bridge unit, - - it simply shifts those requirements to a higher echelon. Second, for some potential theaters, the most effective approach to the strategic deployability issue is the pre-positioning of assets. With this approach, the weight and cube aspects of the problem are basically eliminated, and the overall impact of the bridge

company upon the deployability of the division is reduced tremendously.

### Conclusion

For some theaters, the strategic deployability issue is best handled by pre-positioning heavy and bulky assets. For some contingencies, the strategic deployability of the division can be increased slightly by centralizing the ribbon bridge assets at corps and higher.

## MANEUVERABILITY

### General Discussion

Perhaps more than the strategic deployability, it is the tactical and operational maneuverability of the heavy divisions that is adversely affected by making the ribbon bridge company organic to the division. As indicated earlier, the bridge company with its bridge sets, bridge erection boats, and bridge transporters is not a light and highly maneuverable unit. Simply stated, the bridge company is quite a lot of baggage for the division to carry around the battlefield. Clearly it becomes very valuable baggage when it is needed, but it is baggage just the same. The bridge company is, at times, a vital mobility enhancer. But at other times, it detracts from the very mobility that it is designed to enhance.

### Conclusions

When it is not being used, the bridge company is a

mobility burden that should be shifted to echelons above division. Such would be the result of centralizing bridge units at corps and higher. The key to doing so successfully rests on the ability to shift the appropriate river crossing capabilities down to the division when they are needed there. (See Discussions on Predictability, Frequency, and Responsive Support.)

## VULNERABILITY

### General Discussion

As an organic element of the division, the E-FORCE bridge company would normally be deployed farther forward on the battlefield than if it were a corps unit. As a result, the exposure and vulnerability of limited, valuable bridging equipment are inherently increased. The impact of this issue is, to some degree, moderated by two factors. First, the location of the bridge assets (forward and more vulnerable vs. rearward and more protected) should be determined more so by the tactical situation than by the organizational level at which the bridge company is found. Second, the distinction between forward and rear and thus between 'at risk' and 'safe' will not be very clear on the modern battlefield. Nevertheless, it can be intuitively argued that as a divisional element, the ribbon bridge company would suffer slightly greater exposure than it would if it were at echelons above division. Some might argue that

decentralization produces added dispersion of assets which reduces vulnerability. While equipment dispersion might be an inherent by-product of organizational decentralization, it is wrong to suggest that adequate tactical dispersion is not possible if units are consolidated. Dispersion of critical equipment assets is a tactical imperative which must be accomplished regardless of organizational relationships.

Conclusion

The centralization of the bridging capability will be accompanied by a slight reduction in the vulnerability of these critical assets.

## MAINTENANCE

General

The maintenance issue of the centralization question appears at first glance to be an issue that would strongly favor increased centralization. The normal impact in the maintenance arena of the centralization of units and equipment is a positive one - - efficiencies of scale are achieved as the equipment to be supported is consolidated. In this particular case, entire fleets of bridge specific equipment would be deleted from the division. The requirement to support those fleets would be dropped from each division in the corps and shifted to a corps unit, which is no doubt already supporting other ribbon bridge companies. The savings and improved support normally associated with the

consolidation of equipment and the standardization of support would, in this case, be significant.

The maintenance issue is, however, a two-edged sword. Even under the centralization scenario, the employment concept for these equipment assets is that they would normally be employed well forward in the division area. If under that scenario there is no longer a maintenance support capability within the division, a maintenance support package from a corps unit would have to be formed and sent forward with the bridge company when it is employed. This is inherently inefficient, and this requirement would offset to some degree the savings that are achieved by consolidating.

### Conclusion

In the maintenance arena, efficiencies and savings can be achieved by an increased centralization of bridge units. There will, however, be a price to pay. That price is associated with temporarily re-establishing in some manner a minimal maintenance support capability in the division sector whenever the bridge units are employed forward in the division area of operations. While favoring slightly the centralization alternative, this issue should not be decisive.

## DELINEATION OF RESPONSIBILITY

### General Discussion

The centralization of ribbon bridge assets at echelons

above division would bring into sharp focus the delineation of responsibility concerning the provision of engineer support for river crossing operations. The Division Engineer with its AVLB's would be responsible for supporting the assault crossing of 'short gaps'. The crossing of gaps whose width precludes the use of AVLB's and for which fording and bypassing are not possible would definitely require support from corps. The potential ambiguities associated with limited capabilities (maybe we can - - maybe we can't) are reduced if not eliminated, and responsibilities are firmly and unequivocally fixed upon non-divisional engineers. Such clear-cut responsibility should lead to an increased focus on and a higher priority associated with river crossing operations for non-divisional engineer units. This increased focus would hopefully lead to an improved engineer mission capability.

Considering the degree to which the heavy divisions are already dependent upon corps and higher for river crossing support, there should already exist at echelons above division a strong focus and high priority in this arena. Nevertheless, it can be reasonably anticipated that as dependencies increase and as responsibilities become more clear cut, the mission focus at the responsible echelon will become sharper.

Conclusion

Centralization of bridge assets and capabilities will

definitely result in a clearer delineation of responsibility with respect to engineer support of river crossing operations. A sharper mission focus at the capable and responsible echelon will also result.

## TRAINING

### General Discussion

The clearer delineation of responsibility and the sharper mission focus will be accompanied by an increased training focus. Therefore, the centralization of bridge units should result in stronger training programs for non-divisional bridge units and engineer headquarters. At the same time, however, centralization could complicate and thus adversely affect the conduct of combined arms training in river crossing operations. Without an organic bridging capability, the heavy divisions would have to coordinate for non-divisional engineer involvement in support of their training exercises. Since inadequate combined arms training in gap crossings was identified as a critical deficiency during the 1983 Mission Area Analysis, further degradation of training opportunities in this complex combined arms operation must be avoided. The potential degradation can be avoided or mitigated by the following factors.

The redesignation/reassignment of the bridge companies as non-divisional units need not significantly alter the peacetime training relationships between those bridge units

and their habitually associated divisions. The bridge units could remain in the active force and could continue to be collocated with their respective divisions. A peacetime training relationship could be established between bridge companies and divisions which would have as its goal an appropriate emphasis on the conduct of combined arms training in river crossing operations. In addition, the currently recognized training deficiency applies more to major deliberate river crossings than to hasty river crossings. As a result, the training activities required to correct that deficiency already encompass many non-divisional support units, and thus the conduct of that training would be affected only minimally and only on the margin by a further centralization of bridge assets. With a strong and habitual training relationship continuing between the bridge units and their divisions, the actual impact need not be that great.

The greater danger, perhaps, is one of simple mind-set. River crossing operations are already viewed by some as primarily engineer shows. The sharpened focus that would occur within engineer units outside the division may be accompanied by an unintended and unfortunate reduction in emphasis within the division. The key to successful combined arms training is the recognition by maneuver commanders at the division and brigade level that river crossings are complex mission essential tasks requiring the conduct of periodic, realistic training exercises. A concentrated effort on the part of both the engineers and the maneuver

elements is necessary to ensure that the needed combined arms training is conducted. Such an effort is necessary regardless of where the bridge units are assigned.

Conclusion

A need for increased levels of combined arms training in river crossing operations (particularly deliberate crossings) already exists. The greater centralization of bridge units might tend to result in an apparent de-emphasis on that training requirement at the division level. This potential negative tendency could be countered (continued emphasis on the training requirement, strong training relationships between divisions and the non-divisional support units, etc) and is not considered to be an absolute obstacle to the centralization alternative.

ENDNOTES

9. The BDM Corporation, p. A-1.
10. Ibid., p. A-3.
11. Ibid., p. A-1, A-3.
12. E-FORCE Staff Study.
13. The BDM Corporation, pp. III-17, A-3.
14. Ibid., p. III-17.
15. E-FORCE Staff Study.
16. FM 90-13, p. 3-25.
17. Ibid., p. 1-4.

18. The BDM Corporation, pp. A-1 - A-3.

19. E-FORCE Staff Study.

# CHAPTER III

# CONCLUSIONS AND RECOMMENDATIONS

The discussions of the various issues found in Chapter II do not lead to a simple, clear-cut answer to the overall centralization/decentralization question. Not too surprisingly, the issues are not consistent in their impact upon the question, and there are no issues whose impacts are clearly decisive over all others. It appears to be a 'close call.' Prior to drawing specific conclusions and making detailed recommendations, some observations should be made.

## OBSERVATIONS

Throughout this study, the capability that has been attributed to a bridge unit is the capability that is associated with the bridge assets which are assigned to that unit by its Table of Organization and Equipment (TO&E). It should be recognized that unit capabilities can be expanded and enhanced (on a temporary, mission-oriented basis) by the provision of additional bridge assets. Under some circumstances, issuing more bridge equipment to an employed unit can be more responsive and more cost effective than employing an additional unit. The judicious stockpiling and issue of bridge assets can therefore give added flexibility and increased capability potential to any force-structure approach to gap crossing support.

As indicated earlier, the centralization decision is not clear-cut. For all of the issues which have been examined, the advantages or disadvantages have been discussed. In most cases, the advantages and/or disadvantages have been fairly slight. Certainly, they have been neither totally consistent nor overwhelmingly in favor of a given choice. For all of the issues, both alternatives have been shown to be feasible.

In the absence of an issue (or issues) which clearly demands the selection of one alternative, and in the concurrent absence of an overwhelming accumulation of advantages/disadvantages accruing from a given selection, it is proper to make a decision on the basis of that issue (or those issues) which is of the greatest import. For a critical combat support function (which a river crossing operation clearly is), there is no issue of greater import than that the support be responsive to the needs of the maneuver element. As discussed in Chapter II, the issue of responsive support argues in favor of retaining an assault raft and bridge capability organic to the division. The costs associated with doing so in terms of the impact on other issues (eg slightly reduced strategic deployability, reduced battlefield maneuverability, slightly increased exposure and vulnerability of critical assets, etc) are not unreasonable considering the advantage to be achieved in terms of responsive support.

A decision to retain the divisional ribbon bridge company as an organic element should be accompanied by a full

realization of the principal reason for doing so (to provide immediately responsive support for unanticipated river crossing requirements and/or opportunities). There should also be a minor revision of river crossing concepts and doctrine that would recognize the limited focus of the division's limited float bridge assets and establish a clearer delineation of responsibilities between divisional and non-divisional bridge units for the support of these critical and complex operations. By doing so, an advantage that would have naturally accrued from the increased centralization alternative can still be achieved.

A complete rewriting of doctrine is, of course, beyond the scope of this paper. The basic thrust, however, of the revisions suggested above would be to give to echelons above division primary responsibility for the support of gap crossing operations with only two exceptions: 1) the crossing of short gaps with AVLB's and 2) the conduct or, at least, the initiation of unanticipated, time-sensitive assault river crossing operations. The AVLB's would continue to be a critically important equipment asset of the Assault Sections of the E-FORCE Division Engineer battalions, and the organic bridge company would give the division a limited assault raft and bridging capability. Emphasis and reinforcement of this concept could, perhaps, be achieved by simply identifying the divisional bridge unit as an Assault Raft and Bridge Company (Ribbon).

As has been emphasized, the question of the increased centralization of float bridge assets is not really clear-cut. This stands in stark contrast to the basic E-FORCE concept. E-FORCE is clear-cut. E-FORCE is not a 'close call.' E-FORCE has overwhelming advantages over the status quo, and every effort must be made to ensure its success. As a result, the consolidation of float bridge assets at corps is a very feasible fall-back position on the centralization question in the event that the size of the Division Engineer element as currently designed becomes in any way an obstacle to E-FORCE's approval and implementation.

## SUMMARY

In summary, the detailed discussions of the various issues found above and the observations resulting from those discussions lead to the following conclusions and recommendations:

- In order to facilitate the provision of the most responsive river crossing support possible, a float bridge capability should be retained at the division level.
- In order to increase the overall effectiveness of the total engineer capability in the gap crossing arena, the delineation of responsibilities for divisional and non-divisional engineers should be made clearer. The responsibilities assigned to engineers at echelons above division should take into

consideration the limited focus of the limited gap crossing assets found within the division.

- If the size of the Division Engineer element as currently designed becomes an obstacle to E-FORCE's approval and implementation, serious consideration should be given to effecting a Division Engineer force reduction by moving the bridge company to corps.

The above recommendations are consistent with and support the basic E-FORCE concept. Their favorable consideration and adoption will broaden the tremendous improvements in mobility, countermobility, and survivability support that E-FORCE will make possible on the modern battlefield.

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